

Xinshuo Weng

[Personal Website](#) / [Google Scholar](#) / [DBLP](#) / [Semantic Scholar](#) / [GitHub](#) / [Linkedin](#) / [Twitter](#)

Email: xinshuow@cs.cmu.edu

RESEARCH INTERESTS

Fields: Computer Vision, Machine Learning, Robotics, Multimedia

Topics: 3D Vision, Point Cloud Processing, Graph Neural Networks, Generative Modeling

EDUCATION

Carnegie Mellon University, Ph.D. in Robotics 2018 - Present

Advisor: [Kris Kitani](#), Associate Professor at CMU

Carnegie Mellon University, M.S. in Computer Vision 2016 - 2018

Advisor: [Yaser Sheikh](#), Associate Professor at CMU

Wuhan University, B.S. in Electrical Engineering 2012 - 2016

Advisor: [Lei Yu](#), Associate Professor at Wuhan University

INDUSTRY EXPERIENCE

NVIDIA Autonomous Vehicle Research, Research Intern 2021

Advisor: [Marco Pavone](#), Director of Autonomous Vehicle Research at NVIDIA

Oculus Research Pittsburgh (now Facebook Reality Lab), Research Engineer 2018

Advisor: [Yaser Sheikh](#), Director of Facebook Reality Lab (Pittsburgh)

Facebook, Research Intern 2017

Advisor: [Shou-I Yu](#), Research Scientist at Facebook Reality Lab (Pittsburgh)

AWARDS

FELLOWSHIP AWARDS AND NOMINATIONS

[Facebook Fellowship Finalist](#), 1 out of 6 worldwide in the Computer Vision track 2021

[Qualcomm Innovation Fellowship](#), \$100k award, 1 out of 13 in North America 2020

IBM PhD Fellowship nomination, the only nominee at CMU Robotics Institute 2020

Microsoft Research PhD Fellowship nomination, 1 out of 3 at CMU Robotics Institute 2020

Microsoft Research Ada Lovelace PhD Fellowship nomination, 1 out of 3 at CMU Robotics Institute 2019

Google PhD Fellowship nomination, 1 out of 3 at CMU Robotics Institute 2019

Undergraduate Innovation and Entrepreneurship Fellowship 2014, 2015

CONTRIBUTED FUNDING AWARDS

[Toyota Research Institute Research Grant](#), \$1.13 million award 2021 - 2024

NSF, National Robotics Initiative Research Grant, \$860k award 2020 - 2023

SCHOLARSHIP AWARDS

Google Conference Scholarship	2020
University Scholarship, RMB 3k award per year	2013, 2015, 2016
Yang Gui Scholarship, Wuhan University, RMB 3k award	2015
National Scholarship, RMB 10k award	2014

ACADEMIC AWARDS

Outstanding Reviewer Award , ACCV 2020	2020
Outstanding Graduate Award, Wuhan University	2016

TALKS

INVITED KEYNOTE TALKS

[Scheduled] IV 2021, Workshop on 3D Deep learning for Autonomous Driving	2021
[Scheduled] ICCV 2021, Workshop on Share Stories and Lessons Learned	2021
[Scheduled] CVPR 2021, Workshop on Autonomous Navigation	2021
[Scheduled] CVPR 2021, Workshop on Robust Video Scene Understanding	2021
MIT, Vision and Graphics Seminar [Slides] [Video]	2021
Computer Vision Talks [Slides] [Video]	2020
Wayve [Slides]	2020
ECCV 2020, Workshop on Benchmarking Trajectory Forecasting Models [Slides]	2020
CVPR 2020, Workshop on Scalability in Autonomous Driving [Slides] [Video]	2020
CMU, Robots Perceiving and Doing Lab [Slides1] [Slides2]	2018

CONTRIBUTED TALKS

ICPR 2020, International Workshop on Pattern Forecasting [Slides] [Video]	2021
CoRL 2020 [Slides] [Video]	2020
CMU, Multidrone Symposium 2020 [Slides]	2020
ECCV 2020, Woman in Computer Vision Workshop [Slides] [Video]	2020
ECCV 2020, Workshop on Benchmarking Trajectory Forecasting Models [Slides] [Video]	2020
ECCV 2020, 4D Vision Workshop [Slides1] [Video1] [Slides2] [Video2]	2020
IROS 2020 [Slides] [Video]	2020
CVPR 2020 [Slides] [Video]	2020
WACV 2018 [Slides]	2018

INTERNAL TALKS

CMU, PhD Speaking Qualifier: 3D Multi-Object Tracking for Autonomous Driving [Slides] [Video]	2020
CMU, Seminar at Klab : Games with Sequential Actions – Extensive Games [Slides]	2019
CMU, Seminar at Klab : Object Detection and Tracking in the 3D World [Slides]	2019
CMU, Seminar at Klab : Interpretability of Machine Learning for Computer Vision [Slides]	2018

TEACHING

EBERLY FUTURE FACULTY PROGRAM, CMU

Teaching Inclusively: Fostering a Positive Climate for Learning Spring 2021
Course and Syllabus Design Spring 2021

LECTURER

Guest Lecturer, Computer Vision (16-720), CMU [\[Slides\]](#) Fall 2020

TEACHING ASSISTANCE

Computer Vision (16-385), CMU Fall 2019

Geometry-Based Methods in Computer Vision (16-822), CMU Fall 2018

SERVICES

ORGANIZING COMMITTEE

Lead-Organizer, IROS 2021 workshop on [Multi-Agent Interaction and Relational Reasoning](#) 2021

Co-Organizer, ICCV 2021 workshop on [Multi-Agent Interaction and Relational Reasoning](#) 2021

Lead-Organizer, IJCAI 2021 workshop on [Artificial Intelligence for Autonomous Driving](#) 2021

Lead-Organizer, [AIODrive Forecasting Challenge](#) on CVPR 2021 [Precognition Workshop](#) 2021

Co-Organizer, NeurIPS 2020 Workshop on [Machine Learning for Autonomous Driving](#) 2020

Co-Organizer, [nuScenes 3D Tracking Challenge](#) 2019

JOURNAL REVIEW

T-PAMI (Transactions on Pattern Analysis and Machine Intelligence) 2020, 2021

Neurocomputing 2021

Pattern Recognition Letters 2021

Transactions on Multimedia 2021

CVIU (Computer Vision and Image Understanding) 2021

T-ITS (Transactions on Intelligent Transportation Systems) 2020

MTA (Multimedia Tools and Applications) 2019

T-CSVT (Transactions on Circuits and Systems for Video Technology) 2018

CONFERENCE REVIEW

CVPR (Conference on Computer Vision and Pattern Recognition) 2018, 2020, 2021

ECCV (European Conference on Computer Vision) 2020

ICCV (International Conference on Computer Vision) 2019, 2021

ICLR (International Conference on Learning Representations) 2021

NeurIPS (Conference on Neural Information Processing Systems) 2020, 2021

ICML (International Conference on Machine Learning) 2021

AAAI (Association for the Advancement of Artificial Intelligence) 2020, 2021

ICRA (International Conference on Robotics and Automation) 2020, 2021

IROS (International Conference on Intelligent Robots and Systems) 2020, 2021

BMVC (British Machine Vision Conference) 2020

WACV (Winter Conference on Applications of Computer Vision)	2020, 2021
ACCV (Asian Conference on Computer Vision)	2018, 2020
IV (Intelligent Vehicles Symposium)	2020

CONFERENCE WORKSHOP REVIEW

CVPR, Safe Artificial Intelligence for Automated Driving	2021
CVPR, AI City Challenge	2020

UNIVERSITY ACTIVITY

Thesis Committee, M.S. in Robotics, Sourish Ghosh	2021
Thesis Committee, M.S. in Robotics, Yunze Man	2021
Research Qualifier Committee, Ph.D. in Robotics, Rawal Khirodkar	2021
Admission Committee, M.S. in Computer Vision, CMU	2019, 2020, 2021

MENTORSHIP

PHD STUDENTS

Jinkun Cao (CMU RI PhD)	2020 - Present
Yu-Jhe Li (CMU ECE PhD)	2020 - Present
Yan Xu (CMU ECE PhD)	2020

MASTER STUDENTS

Yunze Man (CMU MSR)	2019 - Present
Yongxin Wang (CMU MSCV, now at Amazon)	2019 - Present
Jingjing Pan (CMU MSCV, now at Apple)	2020
Dazhi Cheng (CMU MSCS, now at Pony AI)	2020
Xi Sun (CMU MSR, now at Amazon)	2019 - 2020
Aashi Manglik (CMU MSR, now at Apple)	2019
Chunhui Liu (CMU MSCV, now at Amazon)	2019
Kai Yu (CMU MSCV, now at Pony AI)	2018
Zhongxu Wang (CMU MSCV, now at WeRide)	2018

UNDERGRADUATE STUDENTS

Shalin Shah (CMU Undergraduate)	2021 - Present
Prakruthi Pradeep (CMU Undergraduate)	2021 - Present
Jinhyung (David) Park (CMU Undergraduate)	2020 - Present

INTERNS / VISITING STUDENTS

Yu-Jhe Li (CMU Intern, now ECE PhD at CMU)	2019 - 2020
Jianren Wang (CMU Intern, now RI Master at CMU)	2019 - 2020
Yunze Man (CMU Intern, now RI MSR at CMU)	2018 - 2019

OUTREACH

Mentor, CMU AI Mentoring Program, CMU	Spring 2021
---------------------------------------	-------------

PUBLICATIONS

MANUSCRIPTS AND PRE-PRINTS

1. Multi-Echo LiDAR for 3D Object Detection
Yunze Man, Xinshuo Weng, Prasanna Kumar Sivakumar, Matthew O'Toole, Kris Kitani
In Submission, 2021
2. Visio-Temporal Attention for Multi-Camera Multi-Target Association
Yu-Jhe Li, Xinshuo Weng, Yan Xu, Kris Kitani
In Submission, 2021
[PDF](#) | [BibTex](#)
3. AgentFormer: Agent-Aware Transformers for Socio-Temporal Multi-Agent Forecasting
Ye Yuan, Xinshuo Weng, Yanglan Ou, Kris Kitani
arXiv:2103.14023, 2021
[PDF](#) | [Code](#) | [Website](#) | [BibTex](#)
4. All-In-One Drive: A Large-Scale Comprehensive Perception Dataset with High-Density Long-Range Point Clouds
Xinshuo Weng, Yunze Man, Dazhi Cheng, Jinhyung Park, Matthew O'Toole, Kris Kitani
In Submission, 2020
[PDF](#) | [Code](#) | [BibTex](#)
5. AutoSelect: Automatic and Dynamic Detection Selection for 3D Multi-Object Tracking
Xinshuo Weng, Kris Kitani
arXiv:2012.05894, 2020
[PDF](#) | [Website](#) | [BibTex](#)

JOURNAL PUBLICATIONS

6. PTP: Parallelized Tracking and Prediction with Graph Neural Networks and Diversity Sampling
Xinshuo Weng^{*}, Ye Yuan^{*}, Kris Kitani
IEEE Robotics and Automation Letters (RA-L), 2021
with presentation at IEEE International Conference on Robotics and Automation (ICRA), 2021
[PDF](#) | [Code](#) | [Website](#) | [BibTex](#)
7. Supervision by Registration and Triangulation for Landmark Detection
Xuanyi Dong, Yi Yang, Shi-En Wei, Xinshuo Weng, Yaser Sheikh, Shoou-I Yu
IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2020
[\(Code on GitHub has received >700 stars\)](#)
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [BibTex](#)

CONFERENCE PUBLICATIONS

8. Wide-Baseline Multi-Camera Calibration using Person Re-Identification
Yan Xu, Yu-Jhe Li, Xinshuo Weng, Kris Kitani
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2021
[PDF](#) | [BibTex](#)
9. Joint Object Detection and Multi-Object Tracking with Graph Neural Networks
Yongxin Wang, Kris Kitani, Xinshuo Weng

- IEEE International Conference on Robotics and Automation (ICRA), 2021*
(Code on GitHub has received >300 stars)
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#)
10. Learning Shape Representations for Person Re-Identification under Clothing Change
Yu-Jhe Li, **Xinshuo Weng**, Kris Kitani
IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), 2021
[PDF](#) | [Demo](#) | [BibTex](#)
 11. Inverting the Forecasting Pipeline with SPF²: Sequential Pointcloud Forecasting for Sequential Pose Forecasting
Xinshuo Weng, Jianren Wang, Sergey Levine, Kris Kitani, Nick Rhinehart
Conference on Robot Learning (CoRL), 2020
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#) | [Supp](#)
 12. 3D Multi-Object Tracking: A Baseline and New Evaluation Metrics
Xinshuo Weng, Jianren Wang, David Held, Kris Kitani
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020
(Code on GitHub has received >1000 stars)
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#)
 13. When We First Met: Visual-Inertial Source Localization for Co-Robot Rendezvous
Xi Sun, **Xinshuo Weng**, Kris Kitani
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020
[PDF](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#)
 14. Single Camera Worker Detection, Tracking and Action Recognition in Construction Site
Hiroaki Ishioka, **Xinshuo Weng**, Yunze Man, Kris Kitani
International Symposium on Automation and Robotics in Construction (ISARC), 2020
[PDF](#) | [BibTex](#)
 15. GNN3DMOT: Graph Neural Network for 3D Multi-Object Tracking with 2D-3D Multi-Feature Learning
Xinshuo Weng, Yongxin Wang, Yunze Man, Kris Kitani
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2020
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#)
 16. Forecasting Time-to-Collision from Monocular Video: Feasibility, Dataset, and Challenges
Aashi Manglik, **Xinshuo Weng**, Eshed Ohn-Bar, Kris Kitani
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [BibTex](#)
 17. Monocular 3D Object Detection with Pseudo-LiDAR Point Cloud
Xinshuo Weng, Kris Kitani
IEEE/CVF International Conference on Computer Vision (ICCV) Workshops, 2019
[PDF](#) | [Code](#) | [Poster](#) | [BibTex](#) | [Supp](#)
 18. Learning Spatio-Temporal Features with Two-Stream Deep 3D CNNs for Lipreading
Xinshuo Weng, Kris Kitani
British Machine Vision Conference (BMVC), 2019
[PDF](#) | [Code](#) | [Poster](#) | [BibTex](#)

19. GroundNet: Monocular Ground Plane Normal Estimation with Geometric Consistency
Yunze Man, **Xinshuo Weng**, Xi Li, Kris Kitani
ACM International Conference on Multimedia (ACMMM), 2019
[PDF](#) | [Poster](#) | [BibTex](#)
20. Supervision-by-Registration: An Unsupervised Approach to Improve the Precision of Facial Landmark Detectors
Xuanyi Dong, Shoou-I Yu, **Xinshuo Weng**, Shi-En Wei, Yi Yang, Yaser Sheikh
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2018
[\(Code on GitHub has received >600 stars\)](#)
[PDF](#) | [Code](#) | [Demo](#) | [Slides](#) | [BibTex](#)
21. Rotational Rectification Network: Enabling Pedestrian Detection for Mobile Vision
Xinshuo Weng, Shangxuan Wu, Fares Beainy, Kris Kitani
IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), 2018
[PDF](#) | [Code](#) | [Poster](#) | [Slides](#) | [BibTex](#)

NON-ARCHIVAL PUBLICATIONS

22. AB3DMOT: A Baseline for 3D Multi-Object Tracking and New Evaluation Metrics
Xinshuo Weng, Jianren Wang, David Held, Kris Kitani
European Conference on Computer Vision (ECCV) Workshops, 2020
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#)
23. End-to-End 3D Multi-Object Tracking and Trajectory Forecasting
Xinshuo Weng*, Ye Yuan*, Kris Kitani
European Conference on Computer Vision (ECCV) Workshops, 2020
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#)
24. Graph Neural Network for 3D Multi-Object Tracking
Xinshuo Weng, Yongxin Wang, Yunze Man, Kris Kitani
European Conference on Computer Vision (ECCV) Workshops, 2020
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#)
25. 4D Forecasting: Sequential Forecasting of 100,000 Points
Xinshuo Weng, Jianren Wang, Sergey Levine, Kris Kitani, Nick Rhinehart
European Conference on Computer Vision (ECCV) Workshops, 2020
[PDF](#) | [Code](#) | [Demo](#) | [Website](#) | [Slides](#) | [BibTex](#)